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ABSTRACT

A presentation of a conceptual framework for viewing the admissions management process in higher education institutions and a discussion of the pricing policy process, particularly of private colleges and universities, precedes an examination of the stochastic utility model, a statistical model of the college choice process. Using student choice data obtained from admitted freshmen applicants to Carnegie-Mellon University, some empirical results are presented that are related to the effects of price, among other factors, on the college choice decision-making behavior process of high school seniors. The two most important factors affecting the college choice process are seen to be college quality and price related considerations, especially the availability of student financial aid. Marketing implications of these results are discussed. (Author/JMD)

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PRICING POLICY AND THE COLLEGE CHOICE PROCESS

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ABSTRACT

Following the presentation of a marketing management paradigm for higher educational institutions, this paper discusses some aspects of the pricing policy process in colleges and universities. A statistical model of the college choice process is developed and some empirical results related to the effects of price, among other factors, on the college choice decision making behavior process of high school seniors are presented and interpreted. The two most important factors affecting the college choice process are seem to be college quality and price related considerations. Marketing implications of these results are discussed.

INTRODUCTION

The changing structure and character of the traditional student markets facing higher educational institutions represent a substantial challenge to the viability of many universities and colleges. Declining enrollments create substantial financial pressures which, in some cases, threaten the continued existence of institutions. As a "solution" to this enrollment problem, many colleges and universities have begun to turn to marketing approaches and techniques to help strengthen and more fully understand the demand side of the enrollment picture.

While there have been many advocates suggesting that colleges should embrace the letter and spirit of the marketing concept -- see, for example, Krachenberg (1972), Fram (1973), Gorman (1974), Chapman and Van Horn (1974), Kotler and Dubois (1974), and Kotler (1975, pp. 344-364; 1976) -- relatively little practical and empirical work is available to specifically assist university administrators in the area of more effective and efficient management of the admissions/recruitment function. Recently, however, an empirical tradition has begun to evolve with regard to researching some of the factors affecting student demand and student college choice behavior, and competitive market considerations. Some examples of such empirical research would include Yaw (1973), Chapman (1974b), Sullivan and Litten (1976), and Hise and Smith (1977).

In thinking about the demand side of the enrollment picture, there are two major researchable areas. The first set of issues involves how high school seniors go about the process of deciding to which colleges they will apply. Once a student chooses which colleges will be in his choice set, the second

key researcherable question arises: how do students choose among colleges? While the former question (the college choice set formation process) is largely still a grey area due to sparse research efforts, the latter question (the college choice process) has seen much research effort directed toward it. Examples of such research on the college choice decision making behavior of high school seniors can be found in Spies (1973), Hopkins, Massy, and Curry (1974), Radner and Miller (1975), and Kohn, Manski, and Mundel (1976). Unfortunately, all of these research efforts have been hampered either by inappropriate statistical modelling techniques or by a lack of complete data (typically, financial aid data) on the college choice process. For a detailed critique of these and other related studies, see Chapman (1977).

The main purpose of this paper is to present some statistical results from a study of college choice decision making behavior. Since the statistical model employed is theoretically defensible and the available data were complete (particularly with respect to the financial aid variables), the results reported here would seem to be the first definitive empirical results available on the college choice decision making behavior of high school seniors.

The next section of this paper presents a conceptual framework for viewing the admissions management process in educational institutions. A discussion of some of the dimensions of pricing policy in educational institutions, with particular attention to private colleges and universities, follows. Then, a statistical model of college choice decision making behavior is motivated and formulated, and empirical results for estimating the model on a sample of data are presented and interpreted.

A MARKETING MANAGEMENT PARADIGM FOR EDUCATIONAL INSTITUTIONS

As a framework for viewing the marketing management task in any organization, consider the following paradigm as developed by Kotler (1971, p. 16):

> "Marketing management seeks to determine the best simultaneous settings of various marketing decision variables under their control (price, promotion, distribution, and product qualities) over time, space, and product lines, in the face of environmental variables not under their control (the economy, competitive activity, technology, and so on) and various constraints that will maximize the firm's long run utility function as defined over a set of goal variables."

Within the educational institution environment, the key components of this marketing management paradigm could be interpreted in the following terms.

-- Goal variables would include aggregate measures of student quality, number and kind of students, and the net tuition revenues (net of scholarships and grants) generated by such enrollments.

-- The utility function would refer to the method by which the tradeoffs among conflicting goals would be resolved. Often this involves a constraint placed on the minimum quality of a student to be considered for admission. This is a distinguishing feature of educational institutions as sellers of a service. Colleges do not allow every individual who desires to consume the service (and who has the money to purchase the service) to actually purchase the service.

-- Constraints include internal school capacity limitations (perhaps

exemplified best by medical schools which have very limited enrollment capacity), organizationally imposed limitations on marketing budgets, class mix constraints, and ethical considerations such as the financial need principle (for determining whether an individual student receives financial aid).

-- Marketing decision variables include components of pricing, promotion and communications activities, and product qualities/characteristics decisions. Included within the product decisions would be the range of academic programs and the characteristics of the programs offered (such as course structure and content, academic standards, and the like) by a school. These variables are within the control of the college and may be manipulated to maximize the college's "utility".

-- Environmental variables include the actions of competitors, the characteristics and preferences of the various student markets, and the actions of federal and state governments in the form and quantity of the financial aid made available to college-going students.

In principle, if we knew the various interrelationships among the marketing decision variables and the environmental variables and if we could quantify the college's goal variables, utility function, and constraints, the marketing management task could be simplified to solving a mathematical programming problem. Unfortunately (or perhaps fortunately!), there are a number of complications that seem to render this, per se, an insolvable problem. Some of these complications would seem to include the following.

-- Product qualities (course offerings, course content, program design, and so on) are actually within the control of various academic departments within a college. Hence, control of the product is typically not within the domain of the admissions manager, the college marketing manager, who is held

responsible for the demand side of the enrollment picture.

-- Measurement problems mask the effects of individual controllable decision variables. Data on what is happening in the student market are generally hard to come by without a sustained and substantial marketing research effort.

-- The marketing decision variables interact. Hence, confounding effects make it very difficult to isolate the influence of any individual decision variable (such as price) on student demand.

-- Difficulties arise in attempting to monitor the external environment. Competitors' counter-marketing strategies and tactics are difficult to monitor before they are actually implemented.

-- Marketing, per se, is sometimes viewed with distaste within the academy.

While this marketing management paradigm faces some obvious difficulties in being operationalized within an educational institution, this paradigm is a useful conceptualization of the task of marketing managers. In particular, this paradigm describes the range of concerns to which the admissions and recruitment management functions in colleges and universities must be oriented. Of the marketing decision variables at the control of a school, pricing policy seems to present both the greatest problems and the greatest opportunities. In the next section, some aspects of the role of pricing policy in educational institutions are discussed.

PRICING POLICIES IN HIGHER EDUCATIONAL INSTITUTIONS

Universities, as one prime function, market higher education to students at the price of tuition. With aggregate student demand decreasing, private universities face a particularly difficult pricing competition problem with regard to the state subsidized tuitions at public educational institutions. Private colleges and universities, in particular, face two serious, if not critical, issues: (1) how to establish enrollment objectives; and, (2) how to acnieve enrollment objectives.

Any discussion of enrollment objectives for a university immediately presents a paradox. Over the past few years, many private universities have attributed their deficits, at least in part, to declining enrollments. At the same time, in conversations with donors, students, and the public, most universities stress the point that the average cost of educating a student far exceeds the amount of tuition. In such a situation, a good businessman might reasonably conclude that the way to eliminate the dificit is to get rid of the students. Yet, most universities are hard at work maintaining or attempting to increase enrollment.

This paradox has a number of explanations. In the short run, universities are, of course, concerned not with average cost but with the marginal revenue and cost associated with incremental students. The marginal revenue is equal to tuition or, for those students receiving financial aid, to tuition less any internally funded scholarships and grants. For schools with recent enrollment declines, marginal costs are close to zero. Facilities ranging from classrooms to computer centers already exist with excess capacity and little, if any, resale value. Faculty, part or most of whom are tenured, also exist. Thus, in

the short run, private universities and colleges see a large incentive to enroll enough students to fully utilize existing faculty and facilities.

In the long run, these arguments disappear. Facilities wear out, faculty contracts expire, and even tenure rules contain provisions for termination in a financial crisis. Fortunately, in the long run, tuition is only a part of the student associated revenues. Gift income comes from donors interested in current and future students, and often donors are former students. Foundations provide grants to student-related programs and components of a school's endowment are typically restricted to student-related programs. Finally, much income from the government directly (and indirectly in terms of research contracts) depends on student-related missions of the university.

Thus, in both the short and the long run, universities may rationally decide to increase or maintain enrollment. The key admissions management issue, of course, follows the establishment of enrollment objectives -- namely, how are the school's enrollment objectives to be attained.

The concept of marketing and admissions planning has separate connotations within public and private colleges. The numerous external constraints placed on public colleges in admissions and financial aid practices tend to rule out the employment of many marketing devices. In contrast, the private sector of higher education has many more degrees of freedom in the formulation and execution of marketing strategy and tactics. Hence, the marketing model of the admissions function tends to be most useful for private institutions and, indeed, private schools seem to be the leaders in adhering to the letter and spirit of the marketing model.

Of all the marketing decision variables, the pricing variable has a particularly significant role to play for private colleges and universities. In turning our attention to the specific role of pricing policy within the

marketing management process in higher educational institutions, an important point to note is that there are a number of components to the college pricing package. Price is not a unidimensional concept. Price includes the following: (1) tuition and fees; (2) room and board; (3) application fees; (4) deposit fees on student confirmation of a matriculation decision; and, (5) financial aid in amount and type. Most schools implicitly recognize that the total cost of attending a school is a composite of all of the above components of the pricing package. As evidence of this, we need only note the prevailing practice of schools in alternating increases in tuition and room and board in successive years, presumably in the hope that students (and their parents) pay less attention to room and board costs than to tuition fees.

There are, as well, fixed and variable components of price both from the point of view of the college and the student. In standard marketing terminology, the pricing components enumerated above are fixed, and might be thought of as a college's "list price", for students who either do not apply or are not eligible for financial aid. However, for students who receive financial aid from a college, a variable pricing component arises. The composition of the total financial aid package (consisting of grant and non-grant aid) which is at the control of the college, effectively allows the college to be a price discriminator at the level of the individual student. A college's "list price" will be effectively reduced by any grant aid that is awarded to a student.

In establishing the grant and non-grant financial aid mix, a college faces an interesting possibility. Namely, the mix can be, at least partially, determined by considerations such as the attractiveness of the student to the college (perhaps as measured by Scholastic Aptitude Test scores) and the likelihood of the student choosing to attend the college. Hence, if we knew

the effect of financial aid and other factors on the probability of a student actually choosing to enroll at a college, the college would be in a position to employ its financial aid mix decisions to "optimize", in some sense, on the demand side of the enrollment picture. What is missing is a model of the college choice process that would allow the impact of financial aid policies on student choice behavior to be assessed. Fortunately, some recent empirical research sheds substantial light on this process. The next section of this paper presents a statistical model and empirical results that seem to go a long way to sorting out the effects of financial aid and other factors on the college choice decision making behavior of high school seniors.

COLLEGE CHOICE DECISION MAKING BEHAVIOR: A MODEL AND SOME EMPIRICAL RESULTS

In this section of the paper, a model of the college choice decision making behavior of high school seniors is developed. This model, the stochastic utility model, while being relatively new to the literature, is a powerful statistical model for analyzing choice processes at the level of the individual decision maker. Empirical results of estimating this model on a sample of data of college-going high school seniors are reported and interpreted. The results presented in this section of the paper are taken from Chapman (1977).

It is important to note that it is the actual college choice process that is being addressed in this section. The statistical research effort being described here is not considering the question of how college choice sets are determined in the first place by college-going high school seniors.

The Development of the College Choice Model

While the college choice process, where students choose among the colleges to which they have applied and been admitted, has received substantial attention from empirical researchers, inappropriate statistical modelling techniques and lack of complete data mean that these past research efforts must be interpreted very cautiously. To understand the nature of these difficulties, consider the following generic model of the college choice process.

Let P_{ij} be the probability that student i chooses college j. Then, a generic model of the college choice process could be expressed as follows:

$$(1) \qquad P_{ij} = f(X_i, Y_i, d_i)$$

where X_i is a matrix of attributes or characteristics (such as college

quality, college size, and so on) of the colleges in student i's choice set, Y_i is a matrix of attributes (such as financial aid awarded to student i by each college in his choice set, the distance from the home of student i to the campus of each college in student i's choice set, and so on) that relate student i to the colleges in his choice set, and d_i is a vector of demographic and socioeconomic characteristics associated with student i (such as sex, age, Scholastic Aptitude Test scores, and so on).

This model in equation (1) makes clear the data requirements for an empirical analysis of the college choice process. Data must be available on both student characteristics and choice set composition. The characteristics of the colleges must be expressed quantitatively as a vector of attributes. Most importantly, to establish a meaningful price variable, financial aid offers to a student from each college in his choice set must be available to the empirical researcher. None of the existing empirical work has been able to capture the effects of financial aid (and, hence, net price) due to a lack of or incomplete financial aid data.

To operationalize the generic college choice model in equation (1), the stochastic utility model may be employed. This model (which is sometimes referred to as the conditional logit model) has its foundations within the psychological literature and was first cast in a form amenable to econometric analysis by McFadden (1974). Some references to this model would include Luce (1959), Luce and Suppes (1965), Nerlove and Press (1973), Domencich and McFadden (1975), and McFadden (1976). This model is developed in detail for the college choice decision making process in Chapman (1977). For a general overview of this model, see Chapman (1978b).

The conditional logit model (also referred to as the stochastic utility model of choice behavior) results in the following closed form expression for

choice probabilities:

$$(2) \qquad P_{ij^*} = \frac{\exp(\Theta Z_{j^*})}{\sum_{j=1}^{J_i} \exp(\Theta Z_j)} \quad , \qquad \text{for } j^* = 1, 2, \ldots , J_i$$

where:

P_{ij^*} = the probability that student i chooses college alternative j^*

Θ = the vector of parameters (importance/salience weights) -- note that $\Theta = [\Theta_1, \Theta_2, \ldots , \Theta_K]$

Z_j = the vector of attributes (or characteristics) associated with alternative j -- note that $Z_j = [Z_{j1}, Z_{j2}, \ldots , Z_{jK}]'$

J_i = the number of college alternatives in choice set i.

The parameters of the conditional logit model in equation (2) are equivalently interpretable as the parameters of the stochastic utility model:

$$(3) \qquad U_{ij} = \Theta Z_j + e_{ij}$$

where the stochastic disturbance terms -- the e_{ij}'s -- follow the double exponential distribution:

$$(4) \qquad \text{Prob}(e_{ij} < t) = \exp\{-\exp(-t)\}.$$

By suitable manipulations of the stochastic utility model, and with the distributional assumption in (4), it is possible to derive the expression in equation (2). See McFadden (1974) or Chapman (1977) for details of the required mathematical manipulations.

The parameters in the conditional logit model in equation (2), and hence the parameters of the stochastic utility model in equation (3), can be estimated by maximum likelihood estimation techniques. One available algorithm for estimating the parameters of this conditional logit model/the stochastic

utility model is CLOGIT -- see Chapman (1978a) for details.

To estimate the parameters of the conditional logit model -- the θ's in equations (2) and (3) -- the actual data requirements include collecting the following from a group of high school seniors: (a) the college alternatives in each student's choice set; (b) the actual college alternative chosen (i.e., preferred) by each student; and, (c) the numerical value of each attribute or characteristic associated with each college alternative in each choice set (i.e., the z_{jk}'s).

As developed by McFadden and others, the conditional logit model in equation (2) and the stochastic utility model in equation (3) operate on the principle of revealed preference: the college alternative actually chosen by a student is assumed to be preferred to all other college alternatives in the student's choice set. The stochastic utility model can also be extended to include the situation where information regarding students' preference rank orderings of all or some of the college alternatives in each college choice set is available. Further details about this procedure can be found in Chapman (1977). Use of such a preference rank ordering has been shown to result in more (statistically) efficient estimates of the parameters of the stochastic utility model.

In applying the stochastic utility model to a particular choice situation, the researcher is typically interested in both the relative importance of the attributes (i.e., the θ's) and in using the model to predict the effects of policy changes on choice behavior. The power of the stochastic utility model lies in its ability to supply meaningful quantitative answers in both of these areas.

The main strength of the stochastic utility model in analyzing the college choice decision making process of high school seniors lies in its explicit

consideration of the competitive nature of the college choice process. Students do not choose among college alternatives in a vacuum, and the nature of a choice process -- a student decision maker choosing among finite college alternatives in a choice set -- must be explicitly considered within the parameter estimation process if any meaningful results are to be obtained. The stochastic utility model does explicitly consider this competitive aspect of the college choice process.

Other strengths of the conditional logit model/the stochastic utility model as an approach to analyzing individual choice behavior include: (a) the model is disaggregate in nature, emphasizing individual choice behavior; (b) the model is consistent with a theory of sampling from a population utility maximizing decision makers (i.e., the model is theoretically based); (c) the model intrinsically satisfies the usual probability laws (i.e., the estimated probabilities are non-negative and sum to 1.0 across the alternatives in each choice set); (d) the choice probability expression in equation (2) has a well-defined closed form; (e) the alternatives in each decision maker's choice set do not have to be identical -- indeed, the number of alternatives in each choice set do not have to be the same; (f) forecasting with the stochastic utility model is straight-forward; and, (g) the choice probability expression in equation (2) can be derived in either of two complementary fashions -- by assuming that the disturbances of the stochastic utility model follow the double exponential distribution or by assuming that Luce's choice axiom -- see Luce (1959) and Luce and Suppes (1965) -- is satisfied.

This model is a powerful and flexible model of individual choice behavior. The stochastic utility model is also consistent with the attribute approach to consumer demand advocated by Lancaster (1966; 1971) and Ratchford (1975).

The Data Base For This Study

The student choice set data for this study were obtained from admitted freshmen applicants to Carnegie-Mellon University's Fall 1973 and Fall 1974 classes. Carnegie-Mellon University is a private, independent, co-educational university located in Pittsburgh, Pennsylvania. Its 3000 undergraduate students are registered in faculties of engineering and science, liberal arts, and fine arts. Since Carnegie-Mellon's applicant information system contained a large amount of student demographic data, the only additional data required from the admitted applicants were in terms of the composition of their choice sets. Specifically, information was sought as to the rank ordering of all schools to which the student had applied, the resulting admissions decisions of those schools, and the composition of any financial aid awards made by the schools admitting the applicants. A census of all admitted applicants, using a survey research questionnaire, was employed to obtain these data.

The general strategy employed in analyzing these data was to pool the two years of available data and then conduct separate analyzes for each of the groups of applicants in different academic areas -- Engineering and Science, Liberal Arts, and Fine Arts. The main purpose for pooling the two years of available data was to ensure that sufficient numbers of choice sets were available for analysis in each of the three academic areas. No external, structural changes occurred between 1973 and 1974 to suggest that such a pooling would confound the subsequent analyses.

In aggregate, the response rate to the survey research questionnaire was 68.4%, with 2391 out of a total of 3495 admitted applicants responding. Even students choosing to attend a school other than Carnegie-Mellon responded with high frequency: Carnegie-Mellon matriculants had about an 80% response rate while other students responded with about a 60% frequency. It is useful to

note in passing that the average choice set sizes across the three academic areas ranged from 2.9 to 3.5 college alternatives and less than 10% of the students in this sample had more than 5 college alternatives in their choice sets.

A substantial number of checks were made on the student reported data to ensure consistency and reliability, particularly with regard to the student reported financial aid information. These data editing checks, described in detail in Chapman (1977), resulted in 17.9% of the responses being deleted from further analysis due to questionable, inconsistent, and unreliable data. Hence, the analyzable data base for this study consisted of 1963 students. A comparison of some demographics (sex, average Scholastic Aptitude Test scores, parental income level, and state of residence) of this final analyzable student data base to the population of Carnegie-Mellon admitted applicants was conducted. No significant non-response bias was detected. (In interpreting the results reported in this paper, it should be noted that the students in this data base generally reside in north-eastern states, have above average parental incomes, and are academically more accomplished than the average American freshman.)

One final point should be noted regarding the student data base. Parental income data were only available for students who had applied for financial aid from Carnegie-Mellon University. The income data were obtained from the Parental Contribution Statements. Since Carnegie-Mellon is a relatively costly university, students not applying for financial aid were judged to be from "high income" families. As will be noted shortly, the student choice set data were analyzed separately for the three academic areas of Engineering and Science, Liberal Arts, and Fine Arts, and within these academic areas by parental income level. Note also that all financial data (i.e., income, cost,

and financial aid data) employed in this study were adjusted by the Consumer Price Index to be in constant April 1974 dollar terms.

To describe the attributes and characteristics of the colleges, 46 different variables were obtained from Furniss (1973) and Dillenbeck and Wetzel (1972). Factor analysis procedures were employed to reduce this large number of variables to a set of composite indices that would serve as college attributes. Six factors were extracted that accounted for 58% of the original 46 college raw variables. For further details of the construction of the college characteristics data base, see Chapman (1977).

A Stochastic Utility Model Analysis of College Choice Behavior

The specific form of the stochastic utility model that was estimated for the medium and low income students, for whom income data were available, was as follows:

$$(5)\quad U_{ij} = \theta_1 FS1_j + \theta_2 FS2_j + \theta_3 FS3_j + \theta_4 FS4_j + \theta_5 FS5_j + \theta_6 FS6_j + \theta_7 (GRANTS_{ij}/1000) + \theta_9 (DRAIN_{ij}/INCOME_i) + \theta_{10} (GRANTS_{ij}/TOTALAID_{ij}) + \theta_{11} (MILES_{ij}/10)^{0.5} + \theta_{12} COMMUTE_{ij} + \theta_{13} (DIFSAT_{ij}/100)^2 + e_{ij}$$

where:

U_{ij} is the utility of college j to student i;

$FS1_j$ to $FS6_j$ are the college characteristics indices for college j (i.e., the factor scores) -- the six indices represent, respectively, "Quality/Affluence", "Size/Graduate Orientation", "Masculinity/Technical Orientation", "Ruralness", "Fine Arts Orientation", and "Liberalness";

$GRANTS_{ij}$ is the total amount of scholarship aid awarded to student i by college j;

$INCOME_i$ is the parental income of student i from the Parents Confidential Statement;

$TOTALAID_{ij}$ is the total financial aid (scholarships, loans, and work-study/part-time job funds) awarded by college j to student i;

$DRAIN_{ij}$ is the total out-of-pocket costs for student i to attend college j (which equals the sum of tuition, room and board, and other miscellaneous expenses minus $TOTALAID_{ij}$, where instate or out-of-state tuition is used as appropriate) -- the sources of the college expense data were Allan and Sucher (1973) and Sucher, Van Dusen, and Jacobson (1974);

$MILES_{ij}$ is the distance from student i's residence to the campus of college j (in miles), where this distance is estimated using the DISTAN algorithm of Chapman (1974a);

$COMMUTE_{ij}$ is a dummy variable, and equals 1 if $MILES_{ij}$ is less than or equal to 30 and the percent of students living on campus in dormitories at college j is less than or equal to 95% (i.e., if student i could live at home and commute to college j), and equals 0 otherwise;

$DIFSAT_{ij}$ is the difference between the mean SAT score for student i and the mean SAT scores for entering freshmen at college j;

$\theta_1, \theta_2, \ldots, \theta_{13}$ are the parameters of the stochastic utility model to be estimated; and,

e_{ij} is the error term in the stochastic utility model.

For the high income students, for whom no income data were available, the following form of the stochastic utility model was estimated:

$$(6) \quad U_{ij} = \theta_1 FS1_j + \theta_2 FS2_j + \theta_3 FS3_j + \theta_4 FS4_j + \theta_5 FS5_j + \theta_6 FS6_j + \theta_8 (DRAIN_{ij}/1000) + \theta_{11} (MILES_{ij}/10)^{0.5} + \theta_{12} COMMUTE_{ij} + \theta_{13} (DIFSAT_{ij}/100)^2 + e_{ij}$$

The actual results of estimating these models for each sub-group of students (Engineering and Science, Liberal Arts, and Fine Arts) are presented in Tables 1 and 2. In estimating these models, the first three rank ordered colleges, where available, were "exploded" following the procedure described

Table 1: Coefficients of the College Choice Models For High Income Students

	Engineering & Science Students	Liberal Arts Students	Fine Arts Students
FS1	0.7610**	0.8692**	0.7656**
FS2	0.1771**	0.1839**	-0.0701
FS3	0.1904**	-0.0071	0.0921*
FS4	-0.0205	0.1032	0.2472**
FS5	-0.1475**	0.0117	-0.0988
FS6	0.1046**	0.2019**	-0.2727**
$\frac{DRAIN}{1000}$	0.0331	0.0467	0.1047
$(MILES/10)^{0.5}$	0.0302	0.1496*	0.0515
COMMUTE	0.0154	0.0934	0.0694
$(DIFSAT/100)^2$	-0.2341**	-0.0915	0.0524
Number of Choice Sets Before Explosion	554	265	271
Number of Choice Sets After Explosion	1152	532	513
Pseudo R^2	0.1277	0.0970	0.1455

** statistically significant at the 0.05 level

* statistically significant at the 0.20 level

Table 2: Coefficients of the College Choice Models For Medium and Low Income (Pooled) Students

	Engineering & Science Students	Liberal Arts Students	Fine Arts Students
FS1	0.5356**	0.5688**	0.4888**
FS2	0.2911**	0.0704	0.3606**
FS3	0.2097**	-0.0213	0.1758*
FS4	0.0496	-0.1505	0.0432
FS5	-0.0905*	-0.0276	0.2236*
FS6	0.1278**	0.0237	-0.0212
$\frac{\text{GRANTS}}{1000}$	0.4892**	0.4827**	0.1446
$\frac{\text{DRAIN}}{\text{INCOME}}$	-0.8552*	-1.9250*	-3.1106**
$\frac{\text{GRANTS}}{\text{TOTALAID}}$	0.1362	-0.4819	0.6196*
$(\text{MILES}/10)^{0.5}$	-0.1208*	0.3917*	0.0733
COMMUTE	0.0548	0.2093	0.4151*
$(\text{DIFSAT}/100)^2$	-0.1689**	0.1146	-0.0655
Number of Choice Sets Before Explosion	588	112	173
Number of Choice Sets After Explosion	1012	183	278
Pseudo R^2	0.1584	0.1615	0.1603

**statistically significant at the 0.05 level

*statistically significant at the 0.20 level

in Chapman (1977) to obtain more statistically efficient parameter estimates. Some preliminary statistical tests indicated that it was possible to pool together the medium and low income students in each of the academic areas.

In reviewing the empirical results in Tables 1 and 2, the first obvious point to note involves the importance of school quality in the college choice process. Across all academic areas and income groups, college quality is consistently a very important factor in the college choice process. Apparently, students are quite rational and, ceteris paribus, prefer higher quality schools to lower quality schools. Also, higher income students seem to value school quality more than ower income students. With regard to the other college attribute variables, less consistency can be observed. In 4 of the 6 groups, school "Size/Graduate Orientation" seems to be viewed positively. Engineering and Science students seem to value "Masculinity/Technical Orientation" and dislike a "Fine Arts Orientation" in a school. Fine Arts students seem to positively value the "Ruralness" of a college.

With regard to the pricing variables, price does not seem to be a factor for high income students, perhaps because they only applied to schools where price was not a problem for them. For the lower income students, price clearly has an important role to play in the college choice process. This is perhaps the single most important result from this empirical study -- <u>for students receiving financial aid, the kind and amount of the financial aid does have an important impact on their college choice behavior</u>. (Note that in interpreting the coefficients on the three price related variables, care must be exercised due to the collinearity among them. It is really the joint effects of all three of these variables that indicate the impact of financial considerations on the college choice decision making process.) Two clear results stand-out from Table 2 -- financial aid does matter and out-of-pocket

costs relative to income does affect college choice behavior.

Turning to the remaining variables, distance seems to be irrelevant to the college choice process. This, of course, does not rule out distance being an important factor in a student's application set formation decision. However, once a student has applied to a set of colleges, these empirical results would suggest that distance is no longer a factor in the choice process. With regard to the issue of "quality zoning" as a factor impacting on college choice behavior, Engineering and Science students seem to be the only ones preferring to attend a college that is close to their own level of academic ability. Again, however, this result has to be interpreted in the light of the application set formation decision that precedes the college choice decision of high school seniors.

To summarize these empirical results, the two most important factors in college choice decision making behavior seem to be college quality and price related issues. At the level of the college choice process, students seem to prefer higher quality colleges, but they would just as soon be able to attend them for as low a net price as possible. Clearly, financial aid mix decisions influence college choice behavior. The marketing implications of these results are obvious. Colleges should emphasize to admitted students that their school is of high quality and that students will be obtaining value for these dollar. Clearly, since money does matter, colleges had better be thoughtful will regard to allocating grants and scholarships to prospective students, since these pricing decisions have a large impact on how students seem to choose among colleges.

In some sense, these empirical results are not really new. After all, what person involved with the admissions/recruitment function in colleges and universities would not have expected just these results. However, the value of

these empirical results goes beyond just confirming a priori beliefs and the present stock of "admissions folklore". The statistical model developed here can be employed to quantitatively analyze the effects of changing financial aid policies of colleges and universities. Thus, for the first time, it seems possible that financial aid mix decisions can be assessed relative to some objective criteria, rather than just best guess judgment.

SUMMARY AND CONCLUSIONS

In summing up this empirical study on the affects that price has on student decision making in the college choice process, the punch line would seem to be that money does matter. Since money does matter, colleges and universities had better be thoughtful about their pricing and financial aid policies. If they are not, you can rest assured that a school's competitors will be, and the obvious consequences do not require elaboration.

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